

# China Study (summary)

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## Background

Author: Colin Campbell, Ph. D. biochemistry

27 years of research funded by National Institute of Health (NIH) and American Cancer Society (ACS)

Professor MIT, Cornell

Family -- owned dairy farm, meat eater, father died of heart attack at 60

## American Health

- ACS reports that males have a 47% chance of getting cancer, females 38%
- One out of thirteen Americans have diabetes.
- According to Journal of American Medical Association (JAMA) medical care is third leading cause of death in America (right after heart disease and cancer) -- physician error, medication error, adverse effects from drugs or surgery

## Proteins

- Proteins function in a variety of ways: enzymes, hormones, structural tissue and transport molecules.
- Proteins are made up of amino acids. Multicolored string of pearls. Oversized wedding dress (Victoria Boutenko)
- Protein efficiency means “promote maximum growth”. High quality protein means high efficiency but this doesn't necessarily mean good health.
- Research shows good health is a result of low-quality plant proteins, which allow for slow and steady -- rather than fast and big -- protein synthesis

## India Study

- Experiment involved liver cancer and protein consumption in two groups of lab rats.
- One group was given Aflatoxin (AF) and then fed diets containing 20% protein — casein, which makes up 87% of cows milk



- Other group was given same level of AF and then fed diets containing only 5% protein (also casein)

### **Conclusion**

Every single rat fed 20% protein got liver cancer or precursor lesions but not a single animal fed the 5% protein diet got liver cancer. Difference not trivial — 100% vs 0%

### **Three Stages of Cancer**

- Initiation — imagine grass seeds planted but not yet growing
- Promotion — grass starts to growth stage (reversible stage)
- Progression — grass growth out of control (non-reversible)

### **Draw Tumor Initiation Process inside a Liver Cell**

**Note:** Most carcinogens do not themselves initiate cancer. They first must be converted to products that are more reactive. This occurs when carcinogen like AF is metabolized by an enzyme, which produces more dangerous by-products that attacks cell DNA.

- Promotion stage is reversible, depending on conditions of growth

### **Replicate India Study**

- Hypothesis was: the protein we consume alters tumor growth by changing how aflatoxin is detoxified by enzymes present in the liver.
- Enzyme activity could be easily modified simply by changing the level of protein intake.
- The more protein ingested the more dangerous by-products produced, which bind to DNA
- A low protein diet actually decreased the binding of AF to DNA -- in other words multiple changes occurred within enzyme complex to reduce activity
- Also, less AF entered cells and cells multiplied less quickly
- **Conclusion:** low protein diet could reduce the number of “seeds” planted during the initiation phase of cancer.
- So what about the promotion stage?

### **Promotion Stage**

- Cancer growth measured by “foci”, precursor clusters of cells that grow into tumors



- Rats in the 20% group had their protein cut to 5% and number of foci sharply declined. Put back on 20% protein, foci proliferated
- Upshot: foci growth could be reversed up and down by switching the amount of protein being consumed
- In a nutshell: **CANCER GROWTH CAN BE TURNED ON AND OFF**
- **ALSO: Protein consumption during promotion trumps the carcinogen, regardless of initial exposure.**
- Conversely, cancer can be reawakened by bad nutrition (greater protein consumption) at a later time
- Most significant finding: Foci did not develop with up to 10% dietary protein. Beyond 10% foci development increased dramatically with increases in dietary protein.

### **American Protein and Fat Consumption**

- Average = 15 or 16% of total calories consumed are protein (roughly 70 to 100 grams of protein per day)
- For comparison: 12 grams of protein in 100 calories of spinach; 13 grams of protein in a 100 grams of steak (but we eat of lot more steak than spinach)
- Americans consume 35 or 40% total calories as fat. Rest is carbs 50 to 55%.
- Dr. Doug Graham recommends: 80/10/10
- Dean Ornish and Pritikin recommend low-fat (20% max) low protein diets.

### **Not All Proteins are Alike**

- Next part of experiment substituted plant protein for casein
- Results: plant protein did not promote cancer growth even at higher levels of intake (20%)
- Grand finale: experiment now moved from foci (short term) to tumor formation over rat's lifetime (long term). All rats given AF and 20% protein died or near death from liver tumors with 100 weeks (rat life usually 2 years). All rats given AF and 5% protein were alive and well after 100 weeks.
- 100% vs 0% results -- identical to India study
- Reversibility also demonstrated: rats changed from 20% to 5% diet suffered 35 to 40% fewer tumors. Rats switched from 5% to 20% started to develop tumors.
- Nutrition switches tumors on and off



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### Corollary Experiments (to determine range)

- Carcinogen changed from AF to Hepatitis B virus (HBV)
- Rats changed to mice
- Identical results: casein promotes liver cancer in rats with AF and mice with HBV
- Even more studies done to extend range of experiment: two other carcinogens (DBMA and NMU) tested on rats with breast cancer, as opposed to liver cancer
- Upshot: two different species, four different carcinogens, two different organs — same results
- Again: initiation stage is far less important than promotion stage. And nutrition is far more important in controlling cancer promotion than the dose of the initiating carcinogen
- Time to test this out on humans!

### China Study

- Chou En Lai dying from cancer so huge study initiated to collect info about disease in chinese population, which was put into China Cancer Atlas
- 87% of chinese population is ethnic Han so gene pool homogenous — but massive variation in cancer rates among the population; some counties with 100 times more cancer than other counties
- Report to US congress in 1981 estimated that **genetics accounts for only 2 to 3% of cancer rate**
- China study involved 65 counties across China and 6,500 adults. Blood tests and urine samples taken over a three-day period. Food samples analyzed and questionnaires about lifestyle and eating habits administered.
- Campbell, two Chinese scientists, one British scientist from Oxford
- RURAL Chinese studied to ensure people lived and ate food in the same area for most of their lives — 90% of subjects still lived in area where they were born. Also wanted to study people who lived on plant-based diet since almost all other large-scale Western nutritional studies had been conducted on meat eaters.
- New York Times called China Study the Grand Prix of epidemiology
- CONTRAST: In America 15% of our total calories comes from protein and 80% of this is from animal-based foods — In China 10% of total calories comes from protein and only 10% from animal foods.
- Chinese eat 1/3 as much fat as Americans, 2/3 as much protein, 3 times more fiber and twice as much iron.



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## Blood Cholesterol

- One of the strongest predictors of Western disease (cancer, heart disease) in Chinese population was blood cholesterol.
- As blood cholesterol levels rose in rural Chinese so did incidence of western disease, even though blood cholesterol levels in Chinese were on average only 127 vs 170 to 290 in Americans.
- Animal-based foods were correlated with increasing blood cholesterol and plant-based foods were correlated with decreasing blood cholesterol.
- In rural China animal protein intake averages 7 grams/day, whereas in America the number is 70 grams/day. But even these small amount of animal-based food in rural China raised the risk for Western disease.
- Correlation between fat intake and animal protein is 90%
- Strong correlation between dietary fat (animal based) and breast cancer
- Low correlation between plant fat and breast cancer
- High fiber intake consistently associated with lower blood cholesterol and lower rates of cancer
- Liver cancer rates of chinese is strongly associated with blood cholesterol

## Antioxidants

- Colors of fruits and vegetables derived from antioxidants
- Antioxidants protect us from free radicals
- Only plant-based foods provide us with antioxidants
- Chinese eat more calories but weigh less
- Low fat, low animal-protein, plant-based diets cause calories to be burned as body heat not stored as body fat

## Conclusion

- Nutrition has a strong effect on disease
- Plant-based foods are linked to lower cholesterol; animal-based foods are linked to higher cholesterol
- Animal-based foods are linked to higher breast cancer rates; plant-based foods are linked to lower breast cancer rates
- Fiber and antioxidants from plants are linked to lower risk of cancers of digestive tract
- Plant-based diets and active lifestyles result in healthy weight
- So-called diseases of affluence are a result of animal-based diets.



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- The same diet — plant-based — is shown to protect against all the main western diseases, including cancer, heart disease, diabetes, osteoporosis, MS and Alzheimer's.

**CONCLUSION** -- Switch to a whole foods, plant-based diet with no refined carbohydrates for optimum health